

CLAIMS:

1. A flexible flat panel display comprising a first substrate characterized in that said first substrate has a modulus of elasticity smaller than or equal to 1.5 GPa.
2. A flexible flat panel display according to claim 1, wherein said first substrate
5 has a modulus of elasticity smaller than or equal to a modulus selected among the group consisting of 1.3 GPa, 1.1 GPa, 1 GPa, 0.9 GPa, 0.8 GPa, 0.7 GPa, 0.6 GPa, 0.5 GPa, 0.4 GPa, 0.3 GPa, 0.2 GPa and 0.1 GPa.
3. A flexible flat panel display according to claims 1 or 2, wherein said flat panel
10 display comprises an electro-optical medium such as a liquid crystal, or an electro-chrome or electro-phoretic element, a light emitting element, an organic or inorganic light emitting element, polymer light emitting element, or any combination thereof.
4. A flexible flat panel display according to any of claims 1 to 3 further
15 comprising one or more layers positioned substantially coplanar and adjacent to upper and/or lower surface of said first substrate.
5. A flexible flat panel display according to any of claims 1 to 4 further
20 comprising a first layer positioned substantially coplanar and adjacent to said first substrate, which first layer has a modulus of elasticity, E_I , and said first substrate has a modulus of elasticity, E_{II} , where is E_I larger than E_{II} .
6. A flexible flat panel display according to claim 5, wherein said first layer is
25 positioned nearest said electro-optical medium and said first substrate furthest from said electro-optical medium.
7. A flexible flat panel display according to any of claims 5 or 6, wherein the ratio E_I/E_{II} is larger than a number chosen among the group of numbers 2, 2.5, 3, 5, 8, 10, 15 or 20.

8. A flexible flat panel display according to any of claims 5 to 7, wherein said first layer has a thickness of up to 80% of the total thickness of said first substrate and said first layer.

5

9. A flexible flat panel display according to any of claims 1 to 8, wherein said first substrate is bendable into a radius of curvature smaller than a radius selected among the group consisting of 300, 200, 100, 50, 40, 30, 20, 15, 10, 5, 3 and 1 mm.

10

10. A flexible flat panel display according to any of claims 1 to 9 further comprising a display substrate positioned coplanar with said first substrate, which display substrate has a modulus of elasticity smaller than or equal to 1.5 GPa.

15

11. A flexible flat panel display according to claims 10, wherein said display substrate has a modulus of elasticity smaller than or equal to a modulus selected among the group consisting of 1.3 GPa, 1.1 GPa, 1 GPa, 0.9 GPa, 0.8 GPa, 0.7 GPa, 0.6 GPa, 0.5 GPa, 0.4 GPa, 0.3 GPa, 0.2 GPa and 0.1 GPa.

20

12. A flexible flat panel display according to any of claims 10 or 11 further comprising one or more layers positioned substantially coplanar and adjacent to upper and/or lower surface of said display substrate.

25

13. A flexible flat panel display according to any of claims 10 to 12 further comprising a second layer positioned substantially coplanar and adjacent to the display substrate, which second layer has modulus of elasticity, E_{III} , and said display substrate has a modulus of elasticity, E_{IV} , where said E_{III} is larger than E_{IV} .

30

14. A flexible flat panel display according to claim 13, wherein the ratio E_{III}/E_{IV} is larger than a number chosen among the group of numbers 2, 2.5, 3, 5, 8, 10, 15 or 20.

15. A flexible flat panel display according to claims 13 or 14, wherein said second layer has a thickness of up to 80% of the total thickness of said display substrate and the second layer.

16. A flexible flat panel display according to any of claims 10 to 15 further comprising a first spacer and a second spacer positioned between said first substrate and said display substrate, and a cell structure for containing said electro-optical medium and defined between said first substrate, said display substrate, said first spacer and said second spacer,
5 said cell structure defining a cell gap between said first substrate and display substrate.

17. A flexible flat panel display according to claim 16, wherein said second layer is positioned nearest said electro-optical medium and said display substrate is positioned furthest from said eletro-optical medium.

10

18. A flexible flat panel display according to any of claims 16 or 17, wherein said flexible flat panel display being adapted to bend into a curvature, while ensuring a relative variation of said cell gap, Δ/d , equal to or smaller than 5%.

15 19. A flexible flat panel display according to any of claims 16 to 18, wherein said flexible flat panel display satisfies the expression:

$$\Delta/d \leq \frac{(\frac{1}{d} + \frac{1}{h})L^4}{\kappa_{Geo} R^2 h}$$

where d is said cell gap, h is thickness of said first or said second substrate, L is the distance between said first and second spacers, κ_{Geo} is a geometric constant, and R is radius of
20 curvature of said flat panel display while bent.

20. A flexible flat panel display according to any of claims 16 to 19, wherein said relative cell gap variation is equal to or smaller than a relative cell gap variation selected among the group consisting of 5%, 4%, 3%, 2.5%, 2%, 1.5%, 1%, 0.5%, 0.25% and 0.1%.

25

21. A flexible flat panel display according to any of claims 10 to 20 further comprising a plurality of first and second spacers positioned between said first and second substrates defining a plurality of cell structures there between.

30 22. A flexible flat panel display according to any of claims 1 to 21, wherein said first substrate comprises a flexible polymer being transparent or opaque.

23. A flexible flat panel display according to any of claims 10 to 22, wherein said display substrate comprise a flexible polymer being transparent or opaque.
24. A flexible substrate characterised in having a modulus of elasticity smaller
5 than or equal to 1.5 GPa.
25. A flexible substrate according to claim 24, wherein said substrate incorporates any features of the flexible flat panel display according to claims 1 to 23.